

REMARKS

Claims 1 - 2, 4 - 18, and 20 - 47 are pending. Claims 1, 9, 11, 17, 23, and 25 - 27 have been amended. No new matter has been introduced. Reexamination and reconsideration of this application are respectfully requested.

In the July 21, 2004 Office Action, the Examiner rejected claims 1-2, 5-13, 15-18, 20 - 21, and 23 - 47 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,504,270 to Sethares ("the Sethares reference"), in view of U.S. Patent No. 5,536,902 to Serra ("the Serra reference"). The Examiner rejected claims 4, 14, and 22 were rejected under 35 U.S.C. §103(a) as being obvious over the Sethares reference, in view of a combination of the Serra reference, and further in view of well known prior art. These rejections are respectfully traversed in so far as they are applicable to the pending claims.

Independent claim 1, as amended, recites:

An apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus comprising:
extracting means for extracting only deterministic components from the input voice signal, the deterministic components including **a plurality of sinusoidal wave components which are numbered sequentially**, wherein the input voice signal includes the deterministic components and residual components;
separating means for separating the sinusoidal wave components into frequency value coordinates and **amplitude value coordinates which are numbered sequentially in a manner the same as the sinusoidal wave components**;
memory means for storing reference pitch information representative of a pitch of the reference voice signal, and reference amplitude information representative of **reference amplitude value coordinates, which are numbered sequentially**, of the sinusoidal wave components contained in the reference voice signal;
first modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the reference pitch information retrieved from the memory means, to generate modulated frequency value coordinates;
second modulating means for modulating the amplitude value coordinates of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates which are numbered correspondingly to the amplitude value coordinates of the input voice signal, retrieved from the memory means such that each amplitude value coordinate of the input voice signal is mixed with a corresponding reference amplitude value coordinate by a ratio which can be set

appropriately;

combining means for combining the modulated frequency value coordinates and the modulated amplitude value coordinates to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal, and influenced by a reference pitch and a reference timbre of the reference voice signal; and

mixing means for mixing the synthesized sinusoidal wave components having the modulated frequency value coordinates to synthesize the output voice signal having a pitch different from that of the input voice signal and influenced by the pitch of the reference voice signal.

The Sethares reference does not disclose, teach, or suggest the apparatus of claim 1, as amended. The Examiner states that the Sethares reference does not teach that the coordinates are numbered sequentially. The Examiner further states that it would have been obvious to provide for the coordinates to be numbered sequentially, so as to facilitate an easy method of storage and retrieval of the coordinates. (*Office Action, page 2*). The applicants agree that the Sethares reference does not teach that the coordinates are numbered sequentially. Specifically, the Sethares reference discloses that the an input signal means receives an audio input signal including an input partial, a reference signal means identifies the frequency and amplitude of a plurality of reference partials, and a dissonance analyzer means to calculate dissonance of one of the input partials (a dissonant partial) relative to the reference partials and for identifying, by frequency and amplitude, a tuned partial near the dissonant partial, the tuned partial having a dissonance that differs from its respective dissonant partial in a predetermined way. The amplitude of the tuned partial is the same as the amplitude of the respective dissonance partial. A synthesizing means produces an output signal comprising the input partials except for each dissonant partial, and the output includes the tuned partial to replace the dissonant partial. (*Sethares reference, col. 7, lines 13 - 67; col. 14, line 51 - col. 16, line 2*). The Sethares

reference does not disclose the sequential numbering of the reference partials, as is recited in claim 1, because it is disclosing that the multiple reference partials are compared by a dissonance analyzer to one of the input partials. Accordingly, applicants respectfully submit that claim 1 distinguishes over the Sethares reference.

In addition, the Sethares reference does not disclose an apparatus including second modulating means for modulating the amplitude value coordinates of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates which are numbered correspondingly to the amplitude value coordinates of the input voice signal, retrieved from the memory means **such that each amplitude value coordinate of the input voice signal is mixed with a corresponding reference amplitude value coordinate by a ratio which can be set appropriately.** The Examiner agrees that the Sethares reference does not disclose modulating of amplitude value coordinates. However, the Examiner states that the modification of the amplitude by modulation is well known and would thus be obvious. (*Office Action, page 4*). The applicants agree that the Sethares reference does not disclose modulating amplitude modulation of amplitude coordinates, and believe that the Sethares reference teaches away from modulating amplitude value coordinates. As noted above, the Sethares reference discloses that the amplitude of the tuned partial is the same as the amplitude of the respective dissonance partial and that a synthesizing means produces an output signal comprising the input partials except for each dissonant partial, but including the tuned partial. In other words, the Sethares reference discloses that no modulation of amplitude coordinates occurs because a tuned partial is replacing a

dissonant partial (the dissonant partial being one of the input partials) and the tuned **partial has the same amplitude as the amplitude of the dissonance partial.**

Thus, there is no modulating of amplitude because the amplitude is the same.

Accordingly, applicants respectfully submit that claim 1, as amended, further distinguishes over the Sethares reference.

Further, the applicants do not agree that it would have been obvious to sequentially number the components of the input voice and the sinusoidal wave components of the reference voice. As apparent from Fig. 5 of the present invention, the absolute frequency f of each sinusoidal wave component varies from time to time, and each sinusoidal component is definitely identified by the number N . This sequential numbering establishes the precise correspondence between the sinusoidal wave components of the input voice and the sinusoidal wave components of the reference voice regardless of their absolute frequency values. This enables the precise modulation of the input voice by the reference voice such that each sinusoidal component of the input voice can be modulated by the sinusoidal component of the reference voice event even if the absolute frequency values vary from time to time. Accordingly, it would not been obvious that it would have been obvious to sequentially number the components in the Sethares reference.

The Serra reference does not make up for the deficiencies of the Sethares reference. There is no disclosure in the Serra reference that **frequency value and amplitude value coordinates of the input voice and the reference voice are sequentially numbered.** Accordingly, applicants respectfully submit that claim 1, as amended, distinguishes over the Serra reference, alone or in combination with the

Sethares reference.

The apparatus of claim 1, as amended, further distinguishes over the Serra reference. The Examiner states the Serra reference does not teach the modification of the frequency and amplitude is achieved via modulation. (*Office Action, page 4*). The applicants agree with the Examiner and note that the Serra reference does not disclose second modulating means for modulating the amplitude value coordinates of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates which are numbered correspondingly to the amplitude value coordinates of the input voice signal, retrieved from the memory means **such that each amplitude value coordinate of the input voice signal is mixed with a corresponding reference amplitude value coordinate by a ratio which can be set appropriately**. Accordingly, applicants respectfully submit that claim 1, as amended, further distinguishes over the Serra reference, alone or in combination with the Sethares reference.

Independent claims 9, 13, 17, and 25 - 27 recite limitations similar to limitations of independent claim 1, as amended. Accordingly, applicants respectfully submit that independent claims 9, 13, 17, and 25 - 27 distinguish over the Sethares and Serra references, alone or in combination, for similar reasons as discussed above in regard to independent claim 1, as amended.

Dependent claims 2, 4 - 8, 10 - 11, 14 - 16, 18, 20 - 24, and 28 - 47 depend, directly or indirectly from independent claims 1, 9, 13, 17, and 25 - 27. Accordingly, applicants respectfully submit that dependent claims 2, 4 - 8, 10 - 11, 14 - 16, 18, 20 - 24, and 28 - 47 all distinguish over the Sethares and Serra references, alone or in

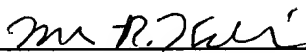
combination, for the same reasons as discussed above in regard to independent claims 1, 9, 13, 17, and 25 - 27.

Applicants believe that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call either of the undersigned attorneys at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

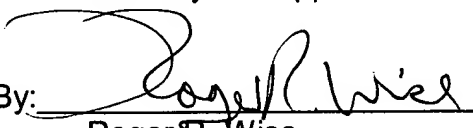
Respectfully submitted,

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